



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/729,834

12/05/2003

Gary R. Holt

10006.001710

8546

31894 7590 05/29/2009

OKAMOTO & BENEDICTO, LLP

P.O. BOX 641330

SAN JOSE, CA 95164

EXAMINER

WERNER, DAVID N

ART UNIT

PAPER NUMBER

2621

MAIL DATE

DELIVERY MODE

05/29/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/729,834	<b>Applicant(s)</b> HOLT ET AL.	
	<b>Examiner</b> David N. Werner	<b>Art Unit</b> 2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2-6 and 8-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2,4-6 and 8-12 is/are rejected.
- 7) ☒ Claim(s) 3 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 July 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This Office action for U.S. Patent Application 10/729,834 is responsive to communications filed 12 February 2009 and 11 May 2009, in reply to the Non-Final Rejection of 8 December 2008. Currently, Claims 2–6 and 8–12 are pending.

2. In the previous Office action, claims 2–6 and 8–12 were rejected under 35 U.S.C. 101 as non-statutory. Claims 2–4, 6, and 8–11 were rejected under 35 U.S.C. 103(a) as obvious over "Motion Compensated Enhancement of Noisy Image Sequences" (Kalivas et al.) in view of International Publication 2000/64167 A1 (Prakash et al.). Claims 5 and 12 were rejected under 35 U.S.C. 103(a) as obvious over Kalivas et al. in view of Prakash et al., and in view of U.S. Patent 5,544,239 A (Golin et al.).

### ***Response to Amendment***

3. Applicant's amendments to the claims have been fully considered. The rejection of the claims under 35 U.S.C. 101 is withdrawn.

### ***Response to Arguments***

4. Applicant's arguments filed with respect to claim 2 have been fully considered but they are not persuasive.

Applicant first states in pages 5–7 of the argument that the “newly-exposed regions” in Prakash et al. cannot be mapped with the claimed segments no longer adjacent to a segment boundary, since the newly-exposed regions do not exist in prior

Art Unit: 2621

frames. It appears Applicant is confusing regions of an image in a segmentation that may move or distort with time with stationary pixels. The pixels that comprise a region or segment do not move, but segment or region boundaries may move relative to the pixels. A pixel that was adjacent to a segment edge in a prior frame but is now part of a newly-exposed region as the edge moves away from the pixel is “no longer adjacent” to a segment boundary.

Applicant next states in page 7 that since the Kalivas or Prakash et al. references do not specifically address “the problem being solved by the claimed invention”, these references are improperly used. Applicant is reminded that when a prior art device necessarily performs a claimed method during its normal and usual operation, it is considered to anticipate the claimed method. MPEP 2112.02.

Applicant next alleges in page 8 that “as admitted by the Examiner in the latest office action, Kalivas et al. teaches against the claimed solution”. This is simply not true. In Kalivas et al., the entire image is weighted between moving foreground objects and the stationary background to reduce blur from moving edges. Pixels comprising areas of the image that were previously in the foreground but now are in the background are weighted along with every other pixel in the image. This weighting is the claimed step of reducing impact of color blur by adjusting weights, when the status of a pixel in a newly-exposed region no longer adjacent to a boundary between the foreground and the background changes.

Considering the above, the examiner respectfully maintains the rejection of claim 2 over the prior art. Likewise, the rejections of claims 5, 6, and 8–12 (Arguments, pp. 8–10) are maintained.

Regarding claim 10, the rejection is clarified to include the combination of the Prakash reference and the Kalivas reference to discuss the reduction of weight in the blur region.

5. Applicant's arguments, see page 11, filed 12 February 2009, with respect to claim 3 have been fully considered and are persuasive. The rejection of claim 3 has been withdrawn.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2, 4, 6, and 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Motion Compensated Enhancement of Noisy Image Sequences" (Kalivas et al.) in view of International Publication 00/64167 A1 (Prakash et al.), admitted as prior art in page 7: line 34–page 8: line 12 of the specification of the present invention, and cited in the Information Disclosure Statement of 18 June 2004.

Kalivas et al. teaches a noise compensation algorithm that reduces the effect of motion blur. Regarding claim 2, in Kalivas et al., a spatiotemporal filter based on motion compensation (§4.2) of an image segmented into moving objects and a static background (§2.1) is used to reduce noise (abstract). This is the claimed first element of "using object motion estimation for arbitrarily shaped segments to align corresponding pixels between at least two frames. The spatiotemporal filter reduces blur (abstract, section §4) by using a weighting system (§2.1) to ensure that only moving pixels are motion compensated (equation 16). This is a portion of the claimed third element of "reducing impact of color blur from said segments that are no longer adjacent by adjusting weights assigned to one or more frames for pixels that lie within a blur region near said segment boundary". The Spatiotemporal Mean Filter defined in equation 16 of Kalivas et al. is the claimed "weighted average of color values of said corresponding pixels" in the fourth element of the claim.

The present invention differs from Kalivas et al. in that the present invention performs special coding on "segments that are no longer adjacent to a segment boundary based on said object motion estimation", as defined in the second element of the claim, or for especially "reducing the impact of color blur" from these segments by adjusting the weights "for pixels that lie within a blur region near said segment boundary" as specified in the third element of the claim.

Prakash et al. teaches a video motion encoder and decoder. This encoder performs segmentation of images (pg. 5: lines 27-34) into moving objects and a background, as does Kalivas et al., but Prakash et al. performs special coding of

Art Unit: 2621

residue data from previously-hidden regions of an image that are freshly exposed due to the motion of the moving objects (page 9: lines 16-29). As shown in pages 2-3 of the 18 July 2008 Office action, the pixels that form these previously-hidden regions are "no longer adjacent to a segment boundary based on object motion estimation", and so determining these areas (page 19: line 3–page 20: line 10) is the claimed step of determining the segments. This residue data may be determined as motionless "background residue" or moving "local residue", as determined by other structural information, such as the locations of boundaries and movement of moving objects in the frame (page 9: line 16–column 10: line 8). By properly determining whether this data is moving or still, the correct value of weighting function  $\lambda$  in Kalivas is applied, thus reducing the impact of blur from these regions, as specified in the third element of the claim.

The Kalivas reference, then, may be considered a "base" method of filtering upon which the present invention is an improvement by reducing the blur from image segments previously adjacent to segment boundaries. The Prakash et al. reference demonstrates a known technique of specially determining previously-hidden segments of an image, considered analogous or equivalent to the claimed previously-adjacent segments, and properly classifying them as background or motion objects to reduce "residue" error data. Therefore, it would have been obvious to one having ordinary skill in the art at the time the present invention was made to use the residual coding techniques of the Prakash reference before applying the motion-compensated spatiotemporal filtering of the Kalivas reference to an image with the predictable result

Art Unit: 2621

of more accurately segmenting an image into moving and stationary components (Kalivas, §1) to reduce blur, since it has been held that to apply a known technique to a known method ready for improvement to yield predictable results involves only routine skill in the art. MPEP 2143(D); *Dann v. Johnston*, 425 U.S. 219, 189 USPQ 257 (1976); *In re Nilsen*, 851 F.2d 1401, 7 USPQ2d 1500 (Fed. Cir. 1988).

Regarding claim 4, Kalivas et al. and Prakash et al. are silent regarding Group of Picture (GOP) structure. However, the examiner takes Official Notice that the limitation of "determining additional motion information across GOP boundaries" is a well-known part of the MPEG standard. A GOP for which motion estimation, prediction, or compensation can be taken from a reference frame across a GOP boundary is well-known in the art as an "open GOP". It would have been obvious for one having ordinary skill in the art at the time the invention was made to include a filter on a video stream having open GOPs, since open GOPs allow for reduced bandwidth in an encoded image sequence.

Regarding claim 6, any apparatus that performs the filtration of Kalivas et al. as enhanced by Prakash et al. would perform the claimed temporal filtration as described in claim 2.

Regarding claim 8, the motion compensation of Kalivas et al. comprises the claimed steps of "estimating motion of objects" and "aligning pixels from a current frame". Calculating the spatiotemporal mean filtering in Kalivas et al. is the claimed step of "calculating a weighted average". Determining the status of residual data in



Prakash et al. and updating the weighting factor of this data in Kalivas et al. is the claimed step of "adjusting weights".

Regarding claim 9, in Prakash et al., a background residue is the claimed "exposed area", and regarding claim 10, in Prakash et al., a local residue encompasses the claimed "region between converging objects". When this region is assigned a weight of 0 in Kalivas et al., (§2.1), this is the claimed adjustment of weights to reduce a weight multiplier in this region.

Regarding claim 11, Kalivas et al. and Prakash et al. are silent regarding Group of Picture (GOP) structure. However, the examiner takes Official Notice that the limitation of "determining additional motion information across GOP boundaries" is a well-known part of the MPEG standard. A GOP for which motion estimation, prediction, or compensation can be taken from a reference frame across a GOP boundary is well-known in the art as an "open GOP". It would have been obvious for one having ordinary skill in the art at the time the invention was made to include a filter on a video stream having open GOPs, since open GOPs allow for reduced bandwidth in an encoded image sequence.

8. Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kalivas et al. in view of Prakash et al. as applied to claims 1 and 8 above, and further in view of US Patent 5,544,239 A (Golin et al.). The above-cited art do not teach adjusting a temporal filter based on a lighting offset.

Golin et al. teaches a motion estimation method that compensates for a fading image. Regarding claims 5 and 12, Figure 1 of Golin et al. shows brightness adjustment unit 104, which calculates base image 106 by reducing pixels in an image by the average pixel brightness in the image and in the next image (column 2: lines 43-53). This is in response to fade detector 101, which stores the frame in a buffer if a sequence is fading (column 2: lines 25-42). Motion analysis unit 108 then determines displacement vectors between the current image and the previous base image (column 3: lines 16-15).

Kalivas, in combination with Prakash, discloses the claimed invention except for calculating a lighting offset. Golin et al. teaches that it was known to calculate motion analysis in an image sequence based on images with adjusted brightness. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add a brightness adjustment unit to a motion analysis system as taught by Golin et al., since Golin et al. states in column 1, lines 41-55 that such a modification would increase accuracy of motion estimation.

### ***Allowable Subject Matter***

9. Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: Claim 3 is drawn to setting the weight for past frames for pixels that lie in a

Art Unit: 2621

newly-exposed area to zero. In contrast, in closest prior art Kalivas, in a temporal filter, if a pixel status changes from background to foreground or foreground to background, a temporal linear interpolation of a weight of 0 and a weight of 1 is used (§ 4.1). This weight, although reduced, cannot be zero for a past pixel, and so teaches away from the claimed invention. The claimed reduction of the weight of pixels of past frames to zero is considered patentable.

### ***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent Application Publication 2002/0106133 A1 (Edgar et al.) teaches a filtering system based on a spatial weighted average of pixel values.

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David N. Werner whose telephone number is (571)272-9662. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571) 272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. N. W./  
Examiner, Art Unit 2621

/Dave Czekaj/  
Primary Examiner, Art Unit 2621